

Proterozoic arsenic dynamics controlled by glaciations

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Increased chemical weathering of trace elements from land to ocean after the Great Oxidation Event is often correlated to biological stimulation near the ocean margins. However, life had to develop strategies to combat the sudden bioavailability of a range of toxic/redox-sensitive elements that became widely accessible because of the GOE. Here, sedimentary As marine records reveal a cyclic Proterozoic arsenic concentration pattern influenced by glacial-interglacial cycles. Postglacial sedimentary arsenic concentrations suggest deterioration of habitable marine conditions may have coincided with atmospheric oxygen decline after ~2.1 billion years ago (Ga). This changed after ~0.58 Ga when marine biota developed widespread stress responses against postglacial reorganization of global marine elemental cycles, producing physiologically robust communities that enabled increased oxygenation of the atmosphere-ocean system and radiation of complex life.